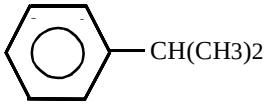
CUMENE

Cumene is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 98-82-8



Molecular Formula: C_9H_{12}

Cumene is a colorless liquid with a gasoline-like odor. It is soluble in alcohol, carbon tetrachloride, benzene, ether, and many other organic solvents, but is insoluble in water (Merck, 1989; Sax, 1987).

Physical Properties of Cumene

Synonyms: 1-methylethylbenzene; cumol; isopropylbenzene

Molecular Weight:	120.20
Boiling Point:	152 - 153 °C
Melting Point:	-96 °C
Flash Point:	39 °C (102 °F) (closed cup)
Vapor Density:	4.2 (air = 1)
Vapor Pressure:	10 mm Hg at 38.3 °C
Density/Specific Gravity:	0.862 at 20/4 °C
Log Octanol/Water Partition Coefficient:	3.66
Conversion Factor:	1 ppm = 4.92 mg/m^3

(HSDB, 1991; Merck, 1989; U.S. EPA, 1994a)

SOURCES AND EMISSIONS

A. Sources

Cumene is found in evaporative emissions from crude oil and finished fuels and cigarette smoke. Other sources of cumene include: vulcanization of rubber; jet engine exhaust; outboard motor operation; solvent use; paint, iron, and steel manufacturing; pharmaceutical production; textile plants; paving and roofing; mining; organics and plastics manufacturing; electroplating; and pulp and paper production (HSDB, 1991). The primary stationary sources that have reported emissions of cumene in California are manufacture in nonferrous foundries (castings), ship and boat building and repair, and manufacture of fabricated metal products (ARB, 1997b).

B. Emissions

The total emissions of cumene from stationary sources in California are estimated to be at least 1,600 pounds per year, based on data reported under the Air Toxics "Hot Spots" Program (AB 2588) (ARB, 1997b).

C. Natural Occurrence

Cumene occurs naturally in petroleum crude and coal tar. It is also found in essential oils from plants, marsh grasses, and a variety of foodstuffs (HSDB, 1991).

AMBIENT CONCENTRATIONS

No Air Resources Board (ARB) ambient concentration data exist for cumene. However, the United States Environmental Protection Agency (U.S. EPA) has compiled ambient air data on cumene from 1976-86 of several urban to suburban locations throughout the United States. The U.S. EPA reported a mean concentration of cumene to be 1.3 micrograms per cubic meter ($\mu g/m^3$) or 0.26 parts per billion (ppb) with a range of 0 to 141 $\mu g/m^3$ (0 to 28.66 ppb). More recent data was compiled during 1990 in Atlanta, Georgia, where a mean cumene concentration of 0.34 $\mu g/m^3$ was reported with a range from <0.06 to 8.3 $\mu g/m^3$ (<0.01 to 1.69 ppb) (U.S. EPA, 1993a).

INDOOR SOURCES AND CONCENTRATIONS

No information about the indoor sources and concentrations of cumene was found in the readily-available literature.

ATMOSPHERIC PERSISTENCE

Cumene in the vapor phase is primarily expected to be removed from the atmosphere through its reaction with the hydroxyl radical. Based on this reaction, the atmospheric half-life and lifetime of cumene is estimated to be 1.5 days and 2.2 days, respectively. The formation of isopropylphenols may be expected from this reaction, by analogy with toluene and the xylenes (Atkinson, 1994).

AB 2588 RISK ASSESSMENT INFORMATION

Although cumene is reported as being emitted in California from stationary sources, no health values (cancer or non-cancer) are listed in the California Air Pollution Control Officers Association Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines for use in risk assessments (CAPCOA, 1993).

HEALTH EFFECTS

Probable routes of human exposure to cumene are inhalation and ingestion (HSDB, 1991).

Non-Cancer: Exposure may cause irritation of eyes, nose, and throat, headaches, and dizziness. Cumene is a potent central nervous system depressant. Levels of 4,000 parts per million may cause unconsciousness (Sittig, 1991; U.S. EPA, 1994a).

The U.S. EPA is currently reviewing the Reference Concentration (RfC) for cumene. They have calculated a provisional RfC of 0.009 milligrams per cubic meter. The U.S. EPA estimates that inhalation of this concentration or less, over a lifetime, would not likely result in the occurrence of chronic non-cancer effects. The U.S. EPA has established an oral Reference Dose (RfD) of 0.04 milligrams per kilogram per day for cumene based on increased average kidney weight in rats. The U.S. EPA estimates that consumption of this dose or less, over a lifetime, would not result in the occurrence of chronic, non-cancer effects (U.S. EPA, 1994a).

No information is available on adverse developmental or reproductive effects in humans. In a study where rats were chronically exposed to high levels of cumene, there was an increased incidence of fetal death and teratogenic effects (U.S. EPA, 1994a).

Cancer: The International Agency for Research on Cancer and the U.S. EPA have not classified cumene with respect to potential carcinogenicity (IARC, 1987a; U.S. EPA, 1994a).